Position Specific Competency Requirements

Field/Technical Job Classifications and Competency Requirements to be addressed are:

Building Shell Technician I

- Possess *Safe Work Practices* competencies

- ***Air Sealing***
  - Possess a working knowledge of:
    - Proper materials selection based on location of leakage areas
    - Minimum ventilation rates.
  - Demonstrate the ability to:
    - Use the blower door to locate leakage sites within the building
    - Seal attic and floor bypasses at penetrations for plumbing, electrical wiring, flue vents, ducts; dropped soffits, and balloon-framed walls;
    - Seal typical bypasses in kneewalls and finished attic spaces;
    - Seal basement band joists;
    - Properly apply caulk and spray foam insulation;
    - Identify, select, and install weatherstripping on doors, windows, and attic hatches;
    - Cut glass, replace broken window panes, and apply glazing compound;
    - Repair plaster and sheetrock (drywall); and
    - Modify or install mechanical ventilation to ensure acceptable indoor air quality for post-air-sealing conditions.
- ***Duct Sealing***
  - Demonstrate the ability to:
    - Properly seal duct connections with mastic and fiberglass mesh tape or other approved material; and
    - Repair or modify duct systems as specified in a work order.
- ***Insulation***
  - Possess a working knowledge of:
    - Properties and appropriate application of different insulation materials; and
    - Potential hazards of insulating around knob-and-tube wiring.
  - Demonstrate the ability to:
    - Install blown and batt attic insulation;
    - Access closed wall cavities and properly install dense-packed cellulose wall insulation including removing and replacing siding;
    - Install batt insulation in a floor and blanket insulation on a foundation wall;
    - Install a vapor barrier on a crawls space floor and a foundation wall;
    - Install water heater installation blankets;
    - Install insulation on ducts, hydronic distribution pipes, and domestic hot water pipes; and
    - Safely operate and properly maintain insulation blowing machines and generators.
- ***Base-Load Measures***
  - Demonstrate the ability to:
    - Replace incandescent light bulbs with compact fluorescent lamps while maintaining or improving lighting levels; and
    - Install low-flow showerheads and faucet aerators;

        - Assess the existing condition of plumbing pipes and faucets that may prohibit these measures.

Building Shell Technician II

- Possess *Safe Work Practices* and *Building Shell Technician I* competencies.
- Possess a working knowledge of advanced building science principles.
- Possess the ability to read and write legibly;
- Possess verbal and written communication skills;
- Possess math skills ; and
- Possess basic computer skills .

- ***Project Management***
    - Demonstrate the ability to:
        - Manage a crew of *Building Shell Technicians* so weatherization work is conducted safely, effectively, and efficiently;
        - Ensure that the job site and *Building Shell Technicians* comply with the *Safe Work Practices* described previously;
        - Maintain quality control of weatherization work and ensure it meets program stands;
        - Understand a work order;
        - Order and obtain materials, supplies, and equipment in time to avoid delays and wasted time on the job site; and
        - Warehouse materials as necessary to avoid delays in completing weatherization work.
- ***Inspection and Measurement***
    - Possess a working knowledge of:
        - Air and heat flow in buildings;
        - Factors that affect building heat loss;
        - Construction features and critical junction points of common housing types;
        - Insulation R-values;
        - Different insulation materials and installation techniques;
        - Various air-sealing techniques and appropriate materials;
        - Causes of and remedies for existing and potential moisture problems;
        - Causes of and remedies for other existing and potential indoor air quality problems;
        - Residential mechanical ventilation systems;
        - Minimum ventilation rates/building tightness limits based on the appropriate ASHRAE 62 standard; and
        - Electric base-load usage.
    - Demonstrate the ability to:
        - Measure the dimensions of floors, walls, ceilings, windows, and doors, and compute surface areas;
        - Compute the volume of conditioned space of a building and convert CFM 50 measurements to ACH;
        - Perform an IR or
        - Define the thermal envelope of a building; and
        - Assess the effectiveness of existing insulation and the effective R-values.
- ***Diagnostic Testing***
    - Blower door
        - Possess a working knowledge of:
            - Principles of air movement and how they relate to building heat loss;
            - Issues that affect the

        - Typical air leakage problems in common housing types; and
        - Minimum ventilation rates.
    - Demonstrate the ability to:
        - Set up a blower door;
        - Prepare a building for a blower door test; and
        - Take blower door reading and interpret results.
- Zone pressure diagnostics (ZPD)
    - Possess a working knowledge of:
        - The air barrier of a building and the importance of aligning it with the thermal barrier; and
        - Primary and intermediate zones of a house.
        - When the use of ZPD is unnecessary.
    - Demonstrate the ability to:
        - Conduct zone pressure diagnostics and interpret results; and
        - Determine the location and effectiveness of the air barrier of a house.
- Duct testing
    - Possess a working knowledge of:
        - Problems associated with different types and locations of duct leakage.
    - Demonstrate the ability to:
        - Determine dominant duct leakage;
        - Determine the amount of duct leakage or at least the existence of significant duct leakage by conducting calibrated hand, pressure pan, duct blaster, or delta Q tests.

Combustion Appliance Technician I

- Possess *Safe Work Practices* competencies, and
- Possess a working knowledge of basic building science principles.

- *Basic Math, Computer and Communication Competencies*
    - Ability to read and write legibly;
    - Basic verbal and written communication skills;
    - Basic construction knowledge;
    - Basic math skills; and
    - Basic computer skills.
- ***Combustion Appliance Operation***
    - Possess a working knowledge of:
        - Gas forced air and convection space heating appliance components;
        - Space heating appliance system efficiency; and
        - Domestic water heating appliances.
- ***Combustion Appliance Safety***
    - Possess a working knowledge of:
        - CO action levels;
        - Common code requirements related to:
            - Vent system sizing, materials, clearances, and installation;
            - Safety shut-off devices;
            - Gas line sizing; and
            - Combustion air;
        - Causes of and remedies to common vent system problems.
    - Demonstrate the ability to:
        - Measure the CO level of vented and unvented combustion appliances;
        - Remedy high CO levels through basic cleaning and adjustments;
        - Understand the difference between as-measured and air-free CO readings;
        - Detect fuel leaks;

- Conduct a worst-case spillage test; and
- Measure the steady-state efficiency of a vented combustion appliance.
- Test out to assure system is operating properly and safely.

- ***Combustion Appliance Ductwork***
  - Demonstrate the ability to:
    - Properly seal duct connections with mastic and fiberglass mesh tape or other approved material; and
    - Repair, modify or install new duct work.

Combustion Appliance Technician II

- Possess *Safe Work Practices* and *Combustion Appliance Technician I* competencies.
- Possess a working knowledge of advanced building science principles.

- ***Heating Equipment***
  - Prerequisites:
    - Possess *Auditor/Combustion Appliance Safety* and *Safe Work Practices* competencies; and
    - Possess the HVAC certifications and licenses as required by the local codes jurisdiction.
  - Possess a working knowledge of:
    - The components of typical gas forced air and hot water distribution systems and the characteristics of their proper operation.
  - Demonstrate the ability to:
    - Maintain quality control of weatherization work and ensure it meets program standards;
    - Repair or replace heating and cooling equipment in a code-compliant manner;
    - Estimate the heating and/or cooling load of a dwelling per Manual J, or other methodology allowed by local code, to ensure proper sizing of replacement heating;
    - Repair vent systems of combustion appliances in a code-compliant manner;
    - Repair a water heater in a code-compliant manner;
    - Ensure proper sizing of gas lines;
    - Assess the adequacy of supply and return plenum and duct sizes for forced-air systems;
    - Determine the proper size and add return and supply plenums and ducts as required;
    - Determine the rate of duct leakage;
    - Conduct duct pressure tests, which could include:
      - Pressure pan;
      - Duct Blaster; and
    - Test air vents, steam traps, thermostatic radiator valves, and hot water zone valves;
    - Bleed unwanted air from a hot water distribution system;
    - Estimate the energy impacts of existing overheating problems in steam and hot water heating systems;
    - Warehouse materials as necessary to avoid delays in completing weatherization work; and

        - Test out to assure system is operating properly and safely.
- ***Heating Equipment Installation***
    - Demonstrate the ability to:
        - Replace vent systems of combustion appliances in a code-compliant manner;
        - Replace a water heater in a code-compliant manner;
        - Replace a space heating appliance in a code-compliant manner;

Auditor/Inspector/Supervisor

- Possess *Safe Work Practices, Building Shell Technician II,* and *Furnace Technician I* competencies.

- ***Energy Auditors must:***
  - Possess a working knowledge of:
    - Air and heat flow in buildings;
    - Factors that affect building heat loss;
    - Construction features and critical junction points of common housing types;
    - Insulation R-values;
    - Different insulation materials and installation techniques;
    - Various air-sealing techniques and appropriate materials;
    - Causes of and remedies for existing and potential moisture problems;
    - Causes of and remedies for other existing and potential indoor air quality problems;
    - Residential mechanical ventilation systems;
    - Minimum ventilation rates/building tightness limits based on the appropriate ASHRAE 62 standard; and
    - Electric base-load usage.
  - Demonstrate the ability to:
    - Measure the dimensions of floors, walls, ceilings, windows, and doors, and compute surface areas;
    - Compute the volume of conditioned space of a building;
    - Define the thermal envelope of a building;
    - Assess the effectiveness of existing insulation and the effective R-values; and
    - Analyze utility bills including breaking out base-load usage from heating and cooling usage.

- ***Diagnostic Testing***
  - Blower door
    - Possess a working knowledge of:
      - Principles of air movement and how they relate to building heat loss;
      - Typical air leakage problems in common housing types; and
      - Minimum ventilation rates.
    - Demonstrate the ability to:
      - Set up a blower door;
      - Prepare a building for a blower door test; and
      - Take blower door reading and interpret results.
  - Zone pressure diagnostics
    - Possess a working knowledge of:
      - The air barrier of a building and the importance of aligning it with the thermal barrier; and
      - Primary and intermediate zones of a house.
    - Demonstrate the ability to:
      - Conduct zone pressure diagnostics and interpret results;
      - When it is unnecessary to conduct ZPD;
      - Determine the location and effectiveness of the air barrier of a house; and
  - Duct testing
    - Possess a working knowledge of:

        - Problems associated with different types of duct leakage.
    - Demonstrate the ability to:
        - Determine dominant duct leakage; and
        - Conduct pressure tests. Potential tests include:
            - Calibrated hand
            - Pressure pan
            - Duct Blaster
        - Seal duct leaks with appropriate materials and good workmanship.
- Boiler distribution system testing
    - Possess a working knowledge of:
        - The components of hot water distribution systems and the characteristics of their proper operation.
    - Demonstrate the ability to:
        - Test hot water zone valves; and
- Base-load systems
    - Demonstrate the ability to:
        - Meter refrigerators to determine their annual energy consumption.
        - Estimate impact of electrical appliances on total energy use.

- ***Combustion Appliance Safety***
    - Possess a working knowledge of:
        - CO action levels;
        - GEOWX and common code requirements related to:
            - Venting systems, materials, clearances, and installation;
            - Safety shut-off devices;
            - Gas line sizing; and
            - Combustion air;
        - Causes of and remedies to common vent system problems.
    - Demonstrate the ability to:
        - Determine when testing and/or measurements are necessary;
        - Measure the CO level of vented and unvented combustion appliances;
        - Understand the difference between as-measured and air-free CO readings;
        - Detect fuel leaks;
        - Conduct a worst-case draft test of a combustion appliance zone;
        - Measure the CAZ to assure sufficient volume for combustion air;
        - Clock a gas meter to determine the actual input of a gas-fired combustion appliance;
        - Conduct basic temperature-rise and static-pressure-drop tests on forced-air furnaces;
        - Perform a cracked heat exchanger inspection;
        - Measure the steady-state efficiency of a vented combustion appliance; and
        - Assess the potential inadequacy of supply and return plenum and duct sizes for forced-air systems.
- ***Measure Selection***
    - Possess a working knowledge of:
        - What materials are allowed to be installed based on 10 CFR 440 Appendix A;
        - The regulatory and policy requirements for selecting weatherization measures using DOE-approved energy audit software or priority lists; and
        - The interaction between typical weatherization measures (e.g., the impact of air-sealing and insulation measures on the potential savings of heating efficiency improvements).
    - Demonstrate the ability to:

        - Use a DOE-approved energy audit to input accurate building data and recommend appropriate, cost-effective weatherization measures;
        - If required, use a DOE-approved priority list to select appropriate, cost-effective weatherization measures;
        - Prioritize air-sealing efforts;
        - Estimate the heating and/or cooling load of a dwelling to ensure proper equipment sizing if the heating or cooling system is to be replaced;
        - Select the proper CFL to replace an incandescent lamp while maintaining or improving lighting levels; and
        - Meter an existing refrigerator or locate its DOE tested usage in a database to estimate annual energy consumption.
- ***Inspectors must:***
    - Possess a working knowledge of:
        - Relevant DOE Weatherization Program regulations and policy;
        - Relevant local codes.
    - Demonstrate the ability to:
        - Verify that the weatherized house is safe by conducting all appropriate combustion appliance safety tests;
        - Evaluate the allow ability and appropriateness of the installed weatherization measures taking into consideration program regulations, policy, energy audit results, and/or priority lists;
        - Assess whether the measures were installed with good workmanship, proper materials, and in such a manner to comply with local code and ensure long-term energy savings over the life of the measures;
        - Ensure that all measures charged to the job were actually installed; and
        - Verify the effectiveness of air-sealing efforts by conducting a blower door test and zone pressure diagnostics.
- ***Consumer Education***
    - Must be provided by Auditors and Inspectors;
    - Must be guided by principles of adult education;
    - Must include:
        - What actions can be taken to reduce energy use in the home;
        - The basic steps in the Weatherization process from auditing, testing, installation, inspection, and monitoring;
        - The purpose of the basic equipment involved in weatherizing a house, including a blower door, pressure pan, combustion analyzer, gas leak detector, insulation blowing machine, and generator; and
        - What actions need to be taken to maintain a healthful indoor environment.
        - Estimate the economic impacts of suggested actions to bolster customer commitment to change.
- ***Work Order and Re-Work Development***
    - Auditors and Inspectors must demonstrate the ability to:
        - Accurately estimate the type and quantity of materials required to cost-effectively weatherize an eligible dwelling unit;
        - Cleary identify and communicate hazards or dangerous situations; and
        - Prepare clearly written work orders for work crews or contractors.